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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,676	01/24/2006	Hachishiro Iizuka	284901US26PCT	5546
22850 7590 06/05/2007 OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER CHEN, KEATH T	
			ART UNIT 1709	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/565,676

Applicant(s)

IIZUKA, HACHISHIRO

Examiner

Keath T. Chen

Art Unit

1709

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 January 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-15, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 7 and 16-18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01/24/2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 01/24/2006.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

The word “directly” of claimed 1 is defined in page 7, second paragraph of the specification and will be examined accordingly.

Drawings

1. The drawings are objected to because Fig. 10 is not labeled as “prior art”. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Art Unit: 1709

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6, 13-15 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Schmitt et al. (US 6596085, hereafter '085).

'085 teaches all limitations of claim 1:

A gas reaction apparatus comprising: a vaporizer (col. 8, lines 17-21, shown as #12 in Fig. 1, including #204 valve body and #280 hot plate in Fig. 2) for producing a reaction gas by vaporizing a liquid source material (Fig. 2, #208 a liquid precursor supply line, col. 4, lines 55-58); and a reaction chamber (Fig. 1, #18, deposition chamber) in which the reaction gas reacts (deposition is a reaction), wherein the vaporizer is configured as a unit for constituent members forming the reaction chamber (#12 is a constituent member forming the top of reaction chamber #18), and the reaction gas produced in the vaporizer is directly introduced into the reaction chamber (vaporized gas in #280 is fed directly into the reaction chamber #18, without passing through any outside line).

'085 further teaches the limitation of claim 2:

The vaporizer (Fig. 1, #12) is directly formed at an outer side of a gas introduction unit (Fig. 2, showerhead #308, part of deposition chamber Fig. 1, #18) for introducing the reaction gas into the reaction chamber. (Vaporizer #12 is at outer side of gas introduction unit #308).

'085 further teaches the limitation of claim 3:

The vaporizer (Fig. 1, #12) is formed above the reaction chamber (#18).

Art Unit: 1709

'085 further teaches the limitation of claim 4:

The vaporizer includes a spraying nozzle (nozzle #240 is disclosed in col. 5, lines 46-60, #240 was not labeled in Fig. 3. #240 is right above #224a. Fig. 3 (#204) is part of vaporizer #12); a vaporizing chamber (Fig. 2, #274) forming a spraying space of corresponding spraying nozzle; a narrow passageway (Fig. 2 and Fig. 5, #282) communicating with corresponding vaporizing chamber; and a draining unit (Fig. 2, space below hot plate #280 and shower head #308, including shadow plate #324) communicating with corresponding narrow passageway and the reaction chamber (#18).

'085 further teaches the limitation of claim 5:

The narrow passageway is formed of one or more passageways annularly disposed (Fig. 5, #282 holes are annularly distributed) around the vaporizing chamber, and an annular draining passage (orifices #344 in shadow plate #324 are annularly distributed) communicating with the narrow passageway is disposed in the draining unit.

'085 teaches all limitations of claim 4, as discussed above. '085 further teaches the limitation of claim 6:

A heater unit (Fig. 2, #280 hot plate and #292 heating jacket) for heating inner surfaces (#272, which is connected to #292) of the vaporizing chamber and the narrow passageway (#282, which is connected to #280).

'085 teaches all limitations of claim 13:

A semiconductor processing apparatus, comprising: a vessel forming a processing chamber (Fig. 1, #18) for processing a substrate to be processed, the vessel

Art Unit: 1709

having a upper plate (Fig. 2, #19, lid) capable of being attached thereto and detached therefrom (col. 4, lines 62-65); a supporting member (#312, susceptor), disposed inside the vessel, for supporting the substrate (#316) to be processed; a showerhead (#308) for supplying a processing gas into the processing chamber, the showerhead being disposed below the upper plate to face the substrate supported by the supporting member; a vaporizing chamber (#274), disposed on the upper plate, for producing the processing gas by vaporizing a liquid source material (from #208); and a gas passage (#282 of hot plate #280 and #284 of the lid #19, col. 8, lines 5-8), configured to connect the vaporizing chamber with the showerhead through the upper plate, for flowing the processing gas.

'085 further teaches the limitation of claim 14:

The vaporizing chamber is formed as a space between the upper plate (Fig. 2, #19, lid) and a cap (atomizer stage #200 and chamber body #270, together, formed a cap) installed on the upper plate.

'085 further teaches the limitation of claim 15:

The gas passage includes a narrow passageway (Fig. 2, #282) formed by a fine gap of 0.5-10.0 mm (col. 7, lines 49-54, see more discussion below) between the cap and the upper plate (#282 is in between of #270 and lid/upper plate #19), and the narrow passageway serves as a path for vaporizing a mist contained in the processing gas.

Note the examiner reads the phrase "between the cap and the upper plate" as describing the narrow passageway, in a broadest interpretation of the claim.

Art Unit: 1709

'085 discloses the claimed invention except for "a fine gap of 0.5-10.0 mm". It would have been obvious to a person having ordinary skill in the art at the time the invention was made to experimenting the size of passageways #282, as described as an result-effective variable "to reduce or eliminate any substantial pressure drop across the hot plate" (col. 7, lines 49-54), and 10.0 mm size #282 is sufficiently large to reduce the pressure drop. In MPEP2144.05 IIB, it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

'085 further teaches the limitation of claim 19:

A spraying nozzle (col. 5, lines 46-60, Fig. 3, the nozzle #240 was not labeled, is right above #224a. #204 is part of vaporizer #12); installed at the cap (#200), for spraying the liquid source material into the vaporizing chamber.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Art Unit: 1709

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
3. Claim 7-8 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over '085, further in view of Sun et al. (US 6409839, hereafter '839).

'085 teaches all the limitations of claim 5, as discussed above.

'085 does not teach:

A filter for capturing solid or liquid phase materials in the reaction gas is disposed inside the draining passage.

'839 is an analogous art in the field of vaporizer for CVD, particularly, in solving the problem of clogging of vaporizer ('085, col. 2, lines 59-62 and '839, col. 2, lines 22-25). '839 teaches that the mixture gas carrying particulate contaminants is harmful to wafer in CVD process (col. 2, lines 22-25). '839 provides a heated porous filter between the vaporizer and the CVD chamber (col. 3, lines 59-60). '839 teaches the integration of vaporization function, filter, and the heated flow restriction in one draining unit (col. 9, line 66 to col. 10, line 2, the housing is a draining unit, filter #160 in Fig. 11).

Furthermore, the filters can be arranged as desired within the draining unit (col. 9, lines 23-27. Therefore, '839 teaches that the filter can be installed at the inlet portion of the draining unit.)

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '839 with '085. Specifically, to have added a filter at the inlet of the draining unit (Fig. 2, at position #284, the opening of lid #19, optionally at the top of #284 and in contact with the heater block #280) for the purpose

Art Unit: 1709

of reducing the contaminants due to particulates from vaporizer with a reasonable expectation of success; therefore, to have arrived the invention of claim 7.

'085 and '839 teach all the limitations of claim 7, as discussed above.

'085 does not teach the limitation of claim 8:

The filter is disposed at a draining port of the draining passage, which communicates with the reaction chamber.

'839 teaches the filter disposed at the draining port (Fig. 11, #160 is at outlet portion which is then connected to the CVD chamber, #26 of Fig. 9.)

For the same reasons given in claim 7 rejection above, at the time the invention was made, a person of ordinary skill in the art would have added the filter at the draining port (in the holes of #344 in Fig. 2) with a reasonable expectation of success; therefore, to have arrived the invention of claim 8.

'085 and '839 teach all the limitations of claim 7, as discussed above.

'085 further provides the limitation of claim 10: a heater unit (Fig. 2, #280) for heating the filter (that have been added to the top of #282).

Note that this heating unit is in keeping with the teaching of '839 (Fig. 11, #158, col. 3, lines 59-60, and col. 10, lines 14-17).

'085 and '839, together, teach all the limitations of claim 10, as discussed above.

'085 further teaches the limitation of claim 11:

The filter (that have been added to the opening #284) makes a thermal contact with an inner surface of the draining passage (the wall of lid #19 facing #284), and

Art Unit: 1709

heated by the heater (#292 and #280) through the inner surface of the draining passage.

'085 and '839, together, teach all the limitations of claim 11, as discussed above.

The limitation of claim 12 is substantially the same reason as discussed in claim 7 rejection above. At the time the invention was made, a person of ordinary skill in the art would have placed the filter at the top of #284 and in contact with the heater block #280, for the additional reason from the teaching of '839 (col. 10, lines 14-17), to further fulfill the purpose of reducing the contaminants due to particulates from vaporizer with a reasonable expectation of success; therefore, a heat transfer unit (the outside of the heater unit #280, as opposed to the resistance heating element itself) is in thermal contact with the filter to have arrived the invention of claim 12.

4. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over '085, further in view of Pang et al. (US 6517634, hereafter '634).

'085 further teaches the limitation of claim 14, as discussed above. '085 does not explicitly teaches the use of a hinge to facilitate the attachment and detachment of the upper plate (#19) and cap (#200).

'634 is an analogous art in CVD, particularly in chamber lid assembly. '634 teaches the use of a hinge assembly with two pivot points that minimize abrasion.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '085 with '634. Specifically, by append a hinge assembly ('634, Fig. 1, #170) to facilitate the attachment and detachment requirement specified in '085 (col. 4, lines 62-65) to minimize abrasion as taught by '634. This hinge

Art Unit: 1709

assembly ('634, Fig. 1, #170) has the capability to rotate the upper plate and the cap as a unit around the hinge as a center with respect to the main body of the vessel. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to have combined '085 with '634 to have obtained the invention of claim 20.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1-8, 10-15, and 19-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-16 and 25-26 of copending Application No. 10/556,355 in view of '085.

Art Unit: 1709

Claims 1-16 and 25-26 of copending Application No. 10/556,355 teaches a reaction chamber and a vaporizer, the latter containing a spraying portion, chamber, a plurality of narrow passageways (in the filter or around the shield) annularly distributed around the vaporizing chamber, heaters, filters, draining port, heaters for heating filters, heat transfer means to filter in the draining passage.

'085 is an analogous art in the field of vaporization, particularly in solving the problem of clogging (col. 2, lines 59-62) same as the mist and particles problem of '355. '085 further teaches a vaporizer disposed above and outside the lid of the process chamber to reduce the opportunities for clogging (col. 2, lines 24-29), as discussed in the claim rejections above. It is obvious for a person of ordinary skill in the art to integrate the vaporizer with the lid of the process chamber as set forth in the 102 and 103 rejections above, to obtain the claims 1-8, 10-15, and 19-20 of the instant application.

This is a provisional obviousness-type double patenting rejection.

Allowable Subject Matter

6. Claims 9 and 16-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: '085 teaches a valve near the injection nozzle (Fig. 2, #204) and a valve at the outlet of processing chamber (#338), but does not fairly teach a valve at the draining portion of the vaporizer. '839 teaches that the outlet valve can be integrated with the

Art Unit: 1709

vaporizer (col. 10, lines 2-3, moving #100 into the chamber in Fig. 11). Neither prior art teach to surround the valve body with a filter.

'085 teaches the integration of vaporizer with the lid of the processing chamber as shown in Fig. 2. '085 does not fairly teach a protrusion defining a sidewall of the vaporizing chamber is formed on the upper plate and the narrow passageway is formed between a top surface of the protrusion and an inner surface of the cap.

Both subject matters are allowable, subjected the context of vaporizer for gas reaction apparatus or semiconductor processing apparatus as specified by the parent claims.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 5776254, 6470144, 4188368, and 6074487 are cited for integrated vaporizer with reaction chamber. US 6036783, 5595606, 6756235 and 6302965 are cited for annularly distributed passageways. 2003/0033978 is cited for the filter arrangement in vaporizer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keath T. Chen whose telephone number is 571-270-1870. The examiner can normally be reached on M-F, 8:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone

Art Unit: 1709

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

kc

K.C.



JENNA BEFUMO
PRIMARY EXAMINER